

Research Article

Development and Evaluation of Papaya Blended Fruit Rollups

V. Saranya¹, K. Uma Devi², Jessie Suneetha W^{1*}, K.B. Suneetha³ and B. Anila Kumari¹¹Post Graduate & Research Centre, Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad – 500030²Department of Foods & Nutrition, College of Home Science, PJTS Agricultural University, Saifabad, Hyderabad – 500 004³Department of Agronomy, College of Agriculture, PJTS Agricultural University, Polasa, Jagtial – 505529**Abstract**

Papaya fruits are rich source of vitamins particularly ascorbic acid and β – carotene. The experiment was conducted to develop papaya blended fruit rollups with black grape, tomato and pineapple in Ezidri food dehydrator. Each blend was prepared in different proportions of 50:50, 70:30 and 60:40 and compared them with cabinet dried control in the ratio of 50:50. In papaya – black grape, papaya – tomato and papaya – pineapple blend combinations, 50:50 ratio blend was most accepted amongst the samples.

Keywords: Fruit rollups, fruit bars, fruit blends, driers, sensory evaluation, papaya, black grapes, tomato, pineapple

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Introduction

India is the second largest producer of vegetables and fourth largest producer of fruits in the world. Although the production of fruits and vegetables are in adequate quantities but the losses in the harvesting and during storage account to about 30 % due to relatively high metabolic activity [1]. In order to reduce wastage in the country, processing fruits as juices, jams, concentrates, pulp, dehydrated products, jellies and fruit leather are few of the options.

Papaya is a rich source of vitamins like riboflavin, folate, thiamine, niacin, C, A and minerals like calcium, iron, potassium along with dietary fiber [2]. Grapes are rich in vitamins like thiamine, riboflavin and minerals like boron, potassium and calcium which are necessary for bone formation and protects against osteoporosis. The polyphenol ‘Resveratrol’ present in skins of red grapes is a well-known anti-carcinogen [3].

Tomato is considered as a “poor man’s orange” because of its attractive appearance and nutritive value [4]. It is a rich source of vitamin C, vitamin A as well as lycopene with its anti-cancer property and inhibits the oxidation of LDL cholesterol [5]. Pineapple has many nutritional benefits providing several essential minerals, fibre and vitamins like thiamine, riboflavin and ascorbic acid. Bromelain is the proteolytic digestive enzyme present that helps in the breakdown of proteins [6].

Papaya fruit flavor may not be appealing to many people and thus limits its usage for its nutritive value. Hence, blending of papaya with fruits like black grape, tomato and pineapple can increase the acceptance of products.

Methodology

Fully matured, firm, ripe and healthy fruits and other ingredients were collected from the local market. The preparation of papaya blend fruit rollups was carried out as below (**Figure 1**).

Papaya fruit pulp was blended with black grape, pineapple and tomato pulps separately in proportions of 50:50, 70:30 and 60:40 respectively. These blends were dried in Ezidri food dehydrator and for control sample in 50:50 ratio in cabinet drier. Papaya pulp blends were mixed with 50⁰ brix sugar syrup containing 0.2% citric acid, 0.2% KMS, 0.2% food grade pectin powder and heated for 5 minutes. Finally, papaya blends were spread uniformly on trays for cabinet drier and fiber sheets for Ezidri to dry for 12-17hrs. The dried fruit leathers were rolled and cut into 3mm thickness of uniform sized rollups. Ezidri and cabinet rollups were subjected to sensory evaluation by 15 semi trained panel using modified 5-point hedonic scale [7].

Results and Discussion

The mean sensory scores of all papaya blended rollups with black grapes, tomato and pineapple at different ratios were evaluated for sensory parameters like appearance, colour, texture, taste, sweetness, shape and overall acceptability against cabinet dried sample as shown in **Table 1**.

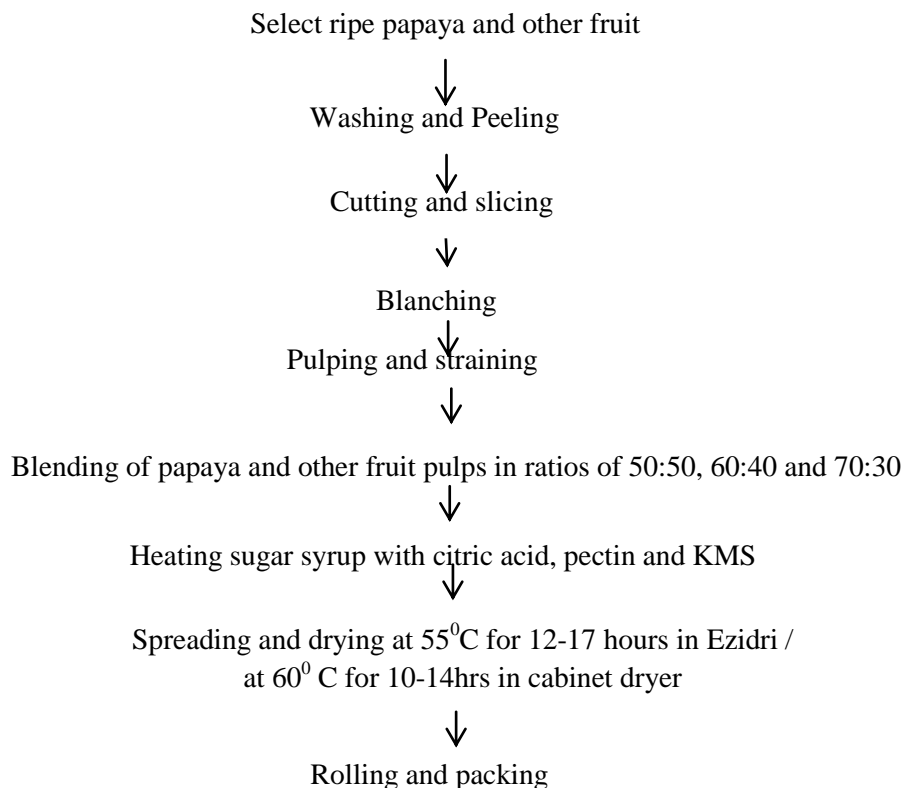


Figure 1 Flowchart of the development of papaya blended fruit rollups

Table 1 Sensory scores of papaya blended fruit rollups while standardization

| Sample | Appearance | Colour | Flavour | Texture | Taste | Shape of fruit rollups | Overall acceptability |
|------------------|-------------|-------------|-------------|-------------|-------------|------------------------|-----------------------|
| CPG | 4.27 ± 0.12 | 4.53 ± 0.16 | 3.66 ± 0.41 | 4.00±0.22 | 4.40± 0.13 | 4.27± 0.21 | 4.27± 0.18 |
| EPG ₁ | 2.73 ± 0.23 | 2.80 ± 0.26 | 3.10 ± 0.21 | 3.80±0.17 | 3.80± 0.22 | 4.13± 0.21 | 3.80± 0.14 |
| EPG ₂ | 3.27 ± 0.27 | 3.26 ± 0.25 | 3.73 ± 0.34 | 3.80±0.24 | 3.87± 0.19 | 4.10± 0.25 | 4.10± 0.15 |
| EPG ₃ | 4.86 ± 0.09 | 4.66 ± 0.16 | 4.20 ± 0.20 | 4.33±0.19 | 4.53± 0.19 | 4.33± 0.21 | 4.53± 0.13 |
| CPT | 4.30 ± 0.21 | 4.40 ± 0.19 | 3.80 ± 0.37 | 4.00±0.28 | 4.20± 0.24 | 4.40± 0.17 | 4.33± 0.13 |
| EPT ₁ | 3.53 ± 0.16 | 4.00 ± 0.24 | 3.20 ± 0.34 | 3.80±0.20 | 3.60± 0.25 | 4.10± 0.18 | 4.00± 0.17 |
| EPT ₂ | 3.8 ± 0.22 | 4.27 ± 0.21 | 3.20 ± 0.33 | 4.13±0.21 | 3.60± 0.21 | 4.33± 0.13 | 4.10± 0.15 |
| EPT ₃ | 4.6 ± 0.16 | 4.53 ± 0.13 | 4.46 ± 0.16 | 4.27±0.20 | 4.60± 0.16 | 4.40± 0.13 | 4.45± 0.16 |
| CPP | 3.93 ± 0.21 | 4.06 ± 0.15 | 4.53 ± 0.16 | 3.80± .20 | 4.33± 0.16 | 4.27± 0.12 | 4.33 ± 0.16 |
| EPP ₁ | 2.27 ± 0.30 | 4.13 ± 0.20 | 3.10 ± 0.32 | 3.93±0.36 | 3.40 ± 0.25 | 3.46 ± 0.33 | 3.33 ± 0.19 |
| EPP ₂ | 3.40 ± 0.26 | 4.20 ± 0.17 | 3.73 ± 0.29 | 4.00 ± 0.21 | 3.67 ± 0.23 | 3.67 ± 0.30 | 3.93 ± 0.21 |
| EPP ₃ | 4.33 ± 0.19 | 4.4 ± 0.13 | 4.66± 0.16 | 4.27± 0.21 | 4.53± 0.16 | 4.43± 0.13 | 4.40± 0.13 |

Note: Values are Mean ± S.D scores.

CPG: Control papaya-black grape (50:50)

EPG₁: Ezidri papaya-black grape (70:30)

EPG₂: Ezidri papaya-black grape (60:40)

EPG₃: Ezidri papaya-black grape (50:50)

CPP: Ezidri papaya-pineapple (50:50)

EPP₁: Ezidri papaya-pineapple (70:30)

CPT: Ezidri papaya-tomato (50:50)

EPT₁: Ezidri papaya-tomato (70:30)

EPT₂: Ezidri papaya-tomato (60:40)

EPT₃: Ezidri papaya-tomato (50:50)

EPP₂: Ezidri papaya-pineapple (60:40)

EPP₃: Ezidri papaya-pineapple (50:50)

Standardization of papaya – black grape fruit rollups

The mean scores for appearance of EPG₁, EPG₂ and EPG₃ were in the order of 2.73, 3.27 and 4.86 against 4.27 of control, for colour were 2.80, 3.26 and 4.66 against 4.53 of control. EPG₃ trial rollups were dark red in color with characteristic attractive and shiny appearance scored highest for overall acceptability. The EPG-3 (50:50) combination retained the balanced flavor of black grape and papaya compared to others therefore, it scored highest with 4.2 against 3.66 of control and the least was EPG-1 with 3.10 followed by 3.73 for EPG-2 roll-ups.

The 'texture' of EPG₃ fruit rollups had highest score of 4.33 due to its 'soft and non-stickiness' against 4.00 of control cabinet dried fruit rollups, while EPG₁ and EPG₂ Ezidri fruit rollups scored 3.80 and 3.80 respectively. EPG₃ combination fruit rollups had well 'balanced taste of papaya and black grape' compared to other proportions and it scored highest with 4.53 on par with control fruit rollups of 4.40 and the least score was seen in EPG₁ fruit rollups with 3.80 followed by 3.87 for EPG₂ where increase in percentage of papaya pulp in the masked the taste of black grapes.

The mean score for 'shape' of papaya grape blended rollups ranged between 4.10 for EPG₂, 4.13 for EPG₁ rollups to 4.33 for EPG₃ fruit rollups against 4.27 of control papaya grape rollups as both EPG₃ and control had 'good and uniform separable layers'. Variation in texture of different proportions might be due to pectin, sugar and acid interactions and grape 's skin that is rich in pectin and acid content. The highest score of 'overall acceptability' was found in EPG₃ with 4.53 against 4.27 of control cabinet fruit rollups and the least accepted was 3.80 for EPG₁ and 4.10 for EPG₃ rollups. Ezidri papaya-black grape (50:50) rollups was well accepted for most of the parameters. Similarly, the fruit bar with seven treatments from pulps of papaya and banana in the ratio of 0:100, 20:80, 40:60, 50:50, 60:40, 80:20 and 100:0 and stored at room temperature in polyethylene bags until further usage were developed. From all the proportions, 50:50 was found to get highest organoleptic score with better consumer acceptability due to balanced flavor of papaya and banana [8].

Standardization of papaya – tomato fruit rollups

The mean scores for 'appearance' of papaya – tomato fruit rollups for EPT₁, EPT₂ and EPT₃ ratios in Ezidri were in the order of 3.53, 3.80 and 4.60 respectively against 4.30 of control 50:50 papaya-tomato fruit rollups from cabinet drier. The score for 'color' in Ezidri were in the order of 4.00, 4.27 and 4.53 respectively against 4.40 of control papaya-tomato fruit rollups from cabinet dryer. All papaya – tomato fruit rollups were in 'bright red color', but the 'characteristic bright red shiny appearance' was better in EPT₃ ratios rollups.

Both cabinet and Ezidri (50:50) fruit roll-ups retained the 'balanced flavor of tomato and papaya' compared to others but EPT₃ scored highest with 4.46, followed by 3.80 for CPT and 3.20 for both EPT₁ and EPT₂. The texture of all samples was 'soft and non-sticky', EPT₃ ratios fruit rollups had highest score of 4.27 against 4.00 of control rollups, while EPT₁ and EPT₂ scored 3.80 and 4.13 respectively.

EPT₃ blend fruit rollups had well 'balanced taste of both tomato and papaya' than other samples with highest score of 4.60 against control papaya-tomato rollups with the score of 4.20 and the least score was seen for EPT₁ and EPT₂ fruit rollups with 3.60 for each as all had pronounced taste of papaya. Increased percentage of papaya pulp in the formulation of EPT₁ and EPT₂ reduced the balanced taste.

All papaya – tomato rollups were 'good with uniform separable layers'. Both EPT₃ and control fruit rollups scored highest for 'shape' with 4.40 and it was followed by EPT₂ and EPT₁ rollups with 4.33 and 4.10 respectively. The highest score for 'overall acceptability' was found in EPT₃ rollups with 4.45 against 4.33 of control cabinet rollups while, EPT₂ rollups obtained a score of 4.10 and the least acceptance with a score of 4.00 was found for EPT₁ rollups. Ezidri papaya-tomato (EPT₃) rollups had scored well by 15 semi trained panelists for almost all sensory parameters.

The standardized the sapota-papaya fruit bar in different proportions by fortifying with skim milk powder and drying in mechanical dehydrator at 55±2°C for 8-10 hrs. The 50:50 ratio of sapota and papaya pulp was found to produce a good fruit bar. The fruit bar was found to be rich in protein due to fortification with skim milk and it was suggested as a supplement for malnourished children [9].

Standardization of papaya-pineapple fruit rollups

The mean scores for 'appearance' of papaya + pineapple fruit rollups for EPP₁, EPP₂ and EPP₃ were 2.27, 3.40 and 4.33 respectively against 3.93 of control papaya-pineapple fruit rollups from cabinet dryer. The mean score for 'colour' of for EPP₁, EPP₂ and EPP₃ were 4.13, 4.20 and 4.40 respectively against 4.06 of control. EPP₃ and control rollups were 'red orange in colour' with 'slightly shiny appearance' while, EPP₁ had 'slightly dull appearance with red orange' and EPP₂ had 'average appearance with red orange color'.

EPP₃ retained the 'balance flavour of pineapple and papaya' which was scored highest with 4.66 against 4.53 of control fruit roll-ups followed by 3.73 for EPP-2 and 3.10 for EPP-1. The texture of EPP₃ fruit rollups had highest score of 4.27 against 3.80 of control cabinet dried papaya-black grape fruit rollups, while EPP₁ and EPP₂ fruit rollups scored 3.93 and 4.00 respectively. The texture of all papaya + pineapple rollups was 'soft and non-sticky texture'.

EPP₃ fruit rollups had well 'balanced taste of papaya and pineapple' compared to other proportions and it scored highest with 4.53 against 4.33 for control fruit rollups and the least score was seen for EPP₁ fruit rollups with 3.40

followed by 3.67 for EPP₂ fruit rollups where ‘pronounced taste of pineapple’ was more expressed than papaya in all fruit roll-up combinations.

The mean score for ‘shape’ of papaya + pineapple blended rollups ranged between 3.46 for EPP₁, 3.67 for EPP₂ rollups to 4.43 for EPP₃ fruit rollups against 4.27 of control papaya-pineapple rollups as both control and EPP₃ rollups had ‘good and uniform separable layers’. The highest score of ‘overall acceptability’ was found in EPP₃ with 4.40 which was on par with 4.33 of control cabinet fruit rollups and the least accepted was 3.33 for EPP₁, and 3.93 for EPP₂ papaya grape rollups. Ezidri papaya – pineapple rollups in the ratio of 50:50 was well accepted for almost all parameters.

The wood apple mango blended bar developed was evaluated for organoleptic qualities of wood apple mango blended bar (50:50) were evaluated in comparison with control sample (wood apple fruit bar). The results on sensory parameters indicated that blended bar was superior in most of the quality attributes [10].

Conclusion

Characteristic shiny dark red color appearance with soft non-sticky texture was well accepted by panelists in Ezidri papaya + black grape (50:50) rollups than other samples and the tartness of black grape balances the sweetness of the fruit rollups. In papaya-tomato combination rollups, both control and EPP₃ rollups had bright red color with soft and non-sticky texture but EPP₃ rollups had characteristic shiny appearance with balanced taste of both the fruits. Papaya-pineapple rollups of control and EPP₃ were in ‘red orange in colour’ with slightly shiny appearance’ and texture was ‘soft and non-sticky with uniform separable layers’ but the taste was well balanced in EPP₃ rollups compared to others. Hence, it was concluded that Ezidri 50:50 ratio of papaya – black grape, papaya – tomato and papaya – pineapple fruit rollups were superior in all parameters and well accepted by consumers compared to other combinations.

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Publication History

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| Received | 26 th Sep 2018 |
| Revised | 18 th Oct 2018 |
| Accepted | 04 th Nov 2018 |
| Online | 30 th Nov 2018 |

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